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# 2019 Oklahoma Replicated Agronomic Cotton Evaluation (RACE) Trial Report

Seth Byrd  
Cotton Extension Specialist

Bradley Wilson  
Graduate Research Assistant

Cayden Catlin  
Graduate Research Assistant

Jerry Goodson  
Extension Assistant, IPM

Heath Sanders  
Area Agronomist

Josh Bushong  
Area Agronomist

Aaron Henson  
Tillman Co. Extension Educator

Charity Martin  
Harmon Co. Extension Educator

Gary Strickland  
Greer and Jackson Co. Extension Educator  
and Dryland Cropping Systems Specialist

## 2019 Season Overview

The 2019 cotton season in Oklahoma will likely be remembered by a rough start and a rough finish, with mostly favorable conditions in between. The cool and wet spring impaired planting across much of the state and prevented planting completely in areas of the northern and eastern regions where large increases in cotton acres were predicted. By mid-June, temperatures had returned to normal levels and the remainder of the summer months provided warm and dry conditions, which lasted well into September. While this provided excellent growing conditions for much of the irrigated crop across the western part of the state, dryland cotton experienced periods of stress due to episodic drought and high temperatures, particularly in the second half of July through the month of August in the southwest portion of Oklahoma. However, intermittent showers prevented the crop from failing completely and dryland yields were consequently better than expected across much of the state. In general, irrigated yields tended to be lower than expected, especially after the favorable temperatures present during the flowering and boll fill stage in August and September. One trend that seemed to be fairly stable across the vast majority of cotton acreage was higher than normal micronaire values. While higher micronaire isn't as uncommon in dryland production, the values in irrigated cotton were higher than what is normally observed. Much like the lower-than-expected yields in the irrigated crop, the elevated micronaire values are likely due to the weather patterns the 2019 crop was exposed to from planting through early fall.

As harvest approached and harvest aid applications began, the entire production region in the state was hit by a freeze event that occurred between October 10th and 12th. While this likely only had a minor impact, if any, on boll development and subsequent crop yield, it had a tremendous impact on the efficacy of harvest aids, particularly on fields that had yet to receive an application. Much of the cotton in the state experienced frost damage to leaves and bolls on the upper 1/3 to 1/2 of the plant, with lower portions of the plant mostly unaffected. Optimal boll opening was still achieved for the majority of harvestable or fully mature bolls, although this process generally took longer than normal regardless of the return to warm temperatures through the remainder of October. Despite the crop condition, leaf and color grades were still largely favorable with the vast majority of the crop having color grades of 31 or better and leaf grades of three or less.

A total of 23 commercial varieties and one experimental variety from five seed companies were evaluated across five locations in the 2019 RACE Trials (Table 1). There were a multitude of insect and herbicide traits represented within these varieties, including both two and three gene *Bt* and herbicide traits (Table 2). Seasonal temperature patterns from the southwest and panhandle regions are illustrated by the monthly heat unit accumulation for 2019 compared to the 11-year average for Altus (Figure 1) and Goodwell (Figure 2).

**Table 1. Seed company participants and variety abbreviations for entries in 2019 Oklahoma RACE Trials.**

<i>Seed Company</i>	<i>Variety Entries</i>	<i>Abbreviation</i>
CROPLAN® Genetics	3475 B2XF	CG 3475 B2XF
	9598 B3XF	CG 9598 B3XF
Deltapine®	1612 B2XF	DP 1612 B2XF
	1646 B2XF	DP 1646 B2XF
	1820 B3XF	DP 1820 B3XF
	1845 B3XF	DP 1845 B3XF
	1851 B3XF	DP 1851 B3XF
	1908 B3XF	DP 1908 B3XF
	1948 B3XF	DP 1948 B3XF
FiberMax®	2398 GLTP	FM 2398 GLTP
	2498 GLT	FM 2498 GLT
NexGen®	1828*	AMX 1828
	2982 B3XF	NG 2982 B3XF
	3930 B3XF	NG 3930 B3XF
	3956 B3XF	NG 3956 B3XF
	4936 B3XF	NG 4936 B3XF
	5711 B3XF	NG 5711 B3XF
PhytoGen®	350 W3FE	PHY 350 W3FE
	400 W3FE	PHY 400 W3FE
	480 W3FE	PHY 480 W3FE
Stoneville®	4480 B3XF	ST 4480 B3XF
	5471 GLTP	ST 5471 GLTP
	5600 B2XF	ST 5600 B2XF
	5707 B2XF	ST 5707 B2XF

\*Experimental variety not released for commercial sale.

**Table 2. Insect and herbicide trait glossary for 2019 Oklahoma RACE Trial entries.**

<i>Insect Trait</i>	<i>Abbreviation</i>	<i>Bt Proteins</i>
Bollgard II®	B2	Cry1Ac + Cry2Ab
Bollgard 3®	B3	Cry1Ac + Cry2Ab + Vip3A
TwinLink®	T	Cry1Ab + Cry2Ae
TwinLink Plus®	TP	Cry1Ab+Cry2Ae+Vip3Aa19
Widestrike 3®	W3	Cry1Ac + Cry1F + Vip3A
<hr/>		
<i>Herbicide Trait</i>	<i>Abbreviation</i>	<i>Herbicide Tolerances</i>
FlexEnlist®	FE	Glyphosate + Glufosinate + 2,4-D
GlyTol LibertyLink®	GL	Glyphosate + Glufosinate
XtendFlex®	XF	Glyphosate + Glufosinate + Dicamba

### Acknowledgements

First and foremost, we would like to thank the Oklahoma cotton producers who serve as cooperators and allow us to use their land, equipment, and time to conduct these trials. These trials wouldn't be possible without their cooperation and support. Financial support for these trials was provided by the Cotton Inc. Oklahoma State Support Committee and the participating seed companies. We would like to thank Khawar Arain, Brendan Kelly, and the staff of the Texas Tech University Fiber and Biopolymer Research Institute for providing fiber classing services for these trials. And finally, we would like to thank the Oklahoma Cotton Council for their support of the cotton agronomy program at Oklahoma State University, as well as the cotton industry as a whole in Oklahoma.

Appreciation also is extended to the staff of the Southwest Research and Extension Center at Altus, the staff of the Caddo Research Station at Fort Cobb and the staff of the Oklahoma Panhandle Research and Extension Center, Goodwell.

### Participating Seed Companies

Americot/NexGen  
CROPLAN Genetics  
Deltapine  
FiberMax/Stoneville  
PhytoGen Cottonseed

For more information, visit [cotton.okstate.edu](http://cotton.okstate.edu) or [ntokcotton.org](http://ntokcotton.org)

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Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. 04/2020 GH.

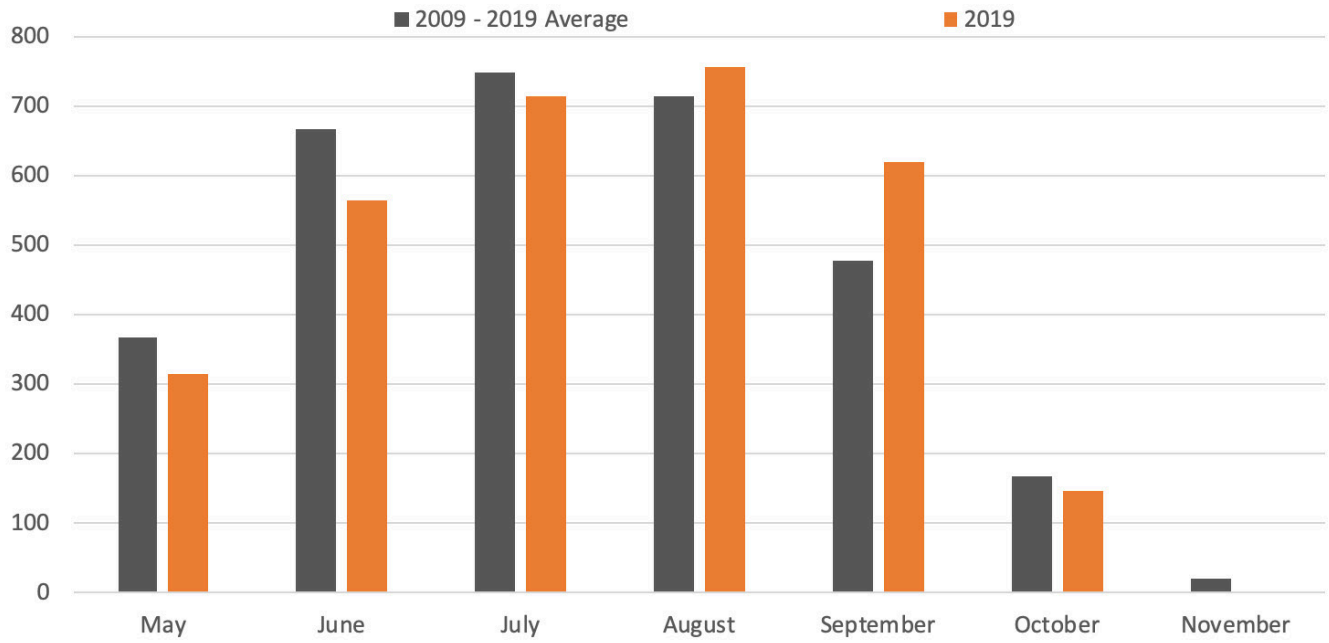


Figure 1. Monthly heat unit (DD 60) accumulation from the Altus Mesonet station.

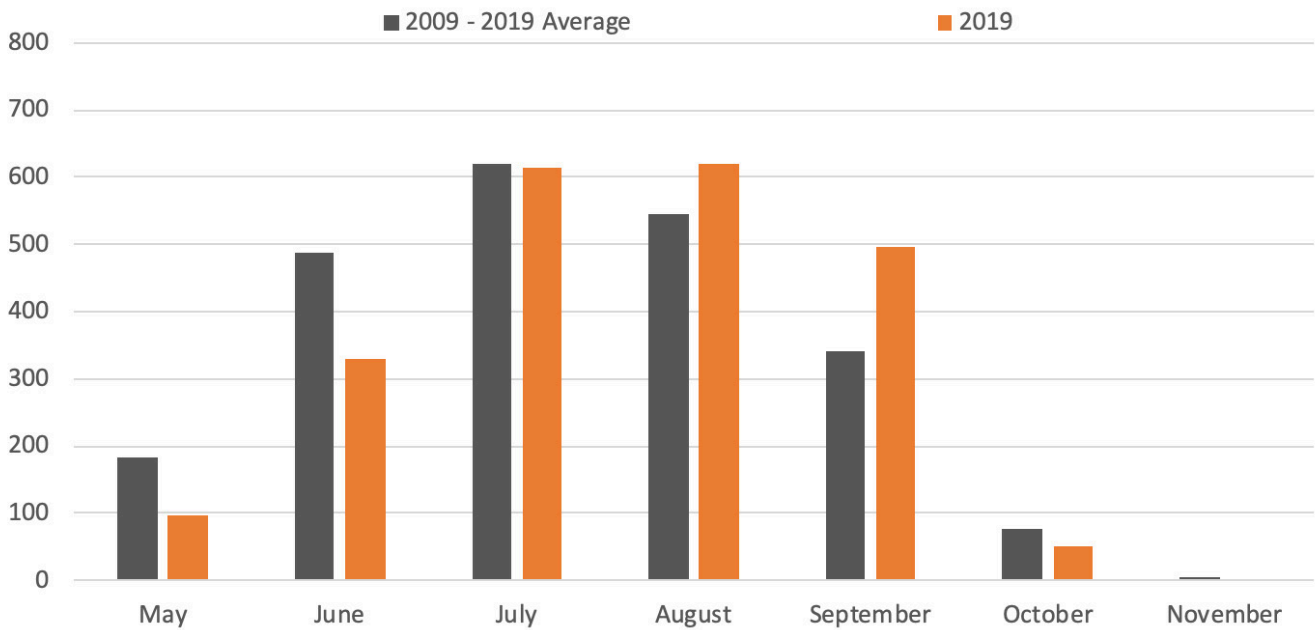


Figure 2. Monthly heat unit (DD 60) accumulation from the Goodwell Mesonet station.

**2019 Greer Co. Dryland RACE Trial Results**  
**Planted: June 12th**  
**Seeding Rate: 25,000 40" row spacing**  
**Harvested: November 4th**

Variety	Lint Yield lbs./acre	Turnout %	Micronaire <sup>1</sup>	Fiber Length inches	Uniformity %	Fiber Strength grams/tex	Loan Value <sup>2</sup> cents/lb.	Return per Acre <sup>3</sup> \$
DP 1845 B3XF	741 a	38.43 a	5.69 bc	1.10 b	81.30 ab	29.5 c	49.08 b-d	\$319 a
ST 5600 B2XF	635 b	37.51 ab	6.26 a	1.08 bc	81.70 ab	30.1 bc	48.57 b-d	\$266 b
DP 1646 B2XF	629 b	37.41 ab	5.32 de	1.08 bc	79.70 c	27.7 d	48.68 b-d	\$261 b
CG 9598 B3XF	628 b	37.20 ab	5.60 b-d	1.09 b	82.20 ab	30.2 bc	49.07 b-d	\$264 b
DP 1820 B3XF	621 bc	36.88 bc	5.65 bc	1.11 b	81.43 ab	31.1 b	50.12 bc	\$266 b
NG 4936 B3XF	611 bc	34.77 de	5.20 e	1.08 bc	81.37 ab	27.6 de	49.88 b-d	\$262 b
ST 5707 B2XF	597 bc	33.71 e	5.90 ab	1.11 b	82.25 ab	33.2 a	49.73 b-d	\$265 b
NG 3930 B3XF	595 bc	35.93 cd	5.41 c-e	1.05 c	81.13 bc	26.2 e	47.73 cd	\$244 bc
DP 1851 B3XF	594 bc	36.86 bc	5.39 c-e	1.05 c	81.63 ab	31.5 b	47.58 d	\$241 bc
NG 5711 B3XF	576 c	35.60 d	5.25 e	1.10 b	82.33 ab	30.1 bc	50.77 b	\$249 b
DP 1948 B3XF	478 d	36.99 bc	4.79 f	1.18 a	82.67 a	31.6 ab	54.10 a	\$216 c
Average	610	36.48	5.50	1.09	81.61	29.89	49.57	\$259
p-value	<.0001	<.0001	<.0001	<.0001	0.0341	<.0001	0.0023	0.0002
pLSD	46	1.27	0.32	0.04	1.49	1.54	2.54	\$30
CV	11.37	3.78	7.56	3.60	1.29	6.90	4.29	11.73

<sup>1</sup>Micronaire samples from this location were re-classed to ensure accuracy.

<sup>2</sup>Color and leaf grades set to base levels (41 and 4, respectively) due to lack of proper lint cleaner on gin.

<sup>3</sup>Return per acre calculated as (lint yield per acre X loan value per pound) - seed cost per acre.

**2019 Harmon Co. Irrigated RACE Trial Results**

**Planted: May 22nd**

**Seeding Rate: 50,000, 40" row spacing**

**Irrigation: Sub-surface drip**

**Harvested: November 19th**

Variety	Lint Yield lbs./acre	Turnout %	Micronaire <sup>1</sup>	Fiber Length inches	Uniformity %	Fiber Strength grams/tex	Loan Value <sup>2</sup> cents/lb.	Return per Acre <sup>3</sup> \$
DP 1948 B3XF	1,826 a	39.08 ab	4.39 bc	1.24 a	83.13 a-d	30.7 cd	54.10 ab	\$903 a
ST 5600 B2XF	1,801 ab	38.92 a-c	4.75 a	1.18 de	83.17 a-c	30.7 cd	51.32 c	\$840 ab
DP 1845 B3XF	1,789 ab	39.55 ab	4.33 bc	1.21 a-c	82.37 b-d	30.9 bc	54.08 b	\$878 ab
NG 4936 B3XF	1,779 ab	36.98 c-e	4.34 a-c	1.18 c-e	83.55 ab	29.3 c-e	54.63 ab	\$872 ab
NG 5711 B3XF	1,711 ab	37.81 b-d	4.40 a-c	1.16 ef	82.27 b-d	30.3 c-e	54.52 ab	\$847 ab
DP 1820 B3XF	1,692 ab	40.83 a	4.53 ab	1.22 ab	83.83 a	32.2 b	54.97 a	\$841 ab
DP 1646 B3XF	1,657 ab	39.71 ab	4.50 a-c	1.20 b-d	82.20 cd	29.2 de	54.50 ab	\$814 ab
ST 5707 B2XF	1,647 b	35.39 e	4.16 c	1.19 b-d	83.67 a	33.9 a	51.63 c	\$783 bc
NG 3930 B3XF	1,474 c	36.88 de	4.16 c	1.15 f	82.00 d	29.1 e	53.77 b	\$712 c
Average	1,709	38.35	4.40	1.19	82.91	30.70	53.72	\$832
p-value	0.0122	0.0008	0.0708	0.0002	0.0223	0.0001	<.0001	0.0322
pLSD	170	2.03	0.37	0.03	1.18	1.57	0.90	\$101
CV	8.65	4.98	8.62	2.80	1.05	5.45	2.52	9.62

<sup>1</sup>Color and leaf grades set to base levels (41 and 4, respectively) due to lack of proper lint cleaner on gin.

<sup>2</sup>Return per acre calculated as (lint yield per acre X loan value per pound) - seed cost per acre.

**2019 Jackson Co. Irrigated RACE Trial Results**

**Planted: May 17th**

**Seeding Rate: 40,000 38" row spacing**

**Irrigation: sub-surface drip located on 72" spacing in furrow**

**Harvested: November 4th**

**TRIAL SUFFERED SLIGHT – MODERATE VISUAL INJURY DUE TO OFF-TARGET MOVEMENT OF 2,4-D**

Variety	Lint Yield (lbs. per acre)	Turnout (%)	Micronaire	Length (inches)	Uniformity (%)	Strength (g/tex)	Loan Value <sup>1</sup> (cents/pound)	Return <sup>2</sup> (\$/acre)
PHY 400 W3FE*	1,906 a	40.15 a-c	4.53 bc	1.18 b	82.37 ab	31.60 b	54.17 a	\$962 a
DP 1845 B3XF	1,894 a	40.50 ab	4.45 c	1.23 a	81.77 b	31.10 bc	54.12 a	\$953 a
FM 2498 GLT	1,851 ab	39.71 a-d	5.26 a	1.15 bc	82.27 ab	29.63 d	50.95 b	\$880 a-c
FM 2398 GLTP	1,835 a-c	42.30 a	5.19 a	1.17 bc	83.30 a	30.43 cd	51.65 b	\$882 a-c
PHY 480 W3FE*	1,828 a-c	37.52 c-e	4.59 bc	1.16 bc	83.50 a	31.20 bc	54.03 a	\$918 ab
PHY 350 W3FE*	1,786 a-d	37.22 de	4.67 bc	1.15 bc	83.13 a	30.47 cd	53.92 a	\$893 a-c
ST 5471 GLTP	1,767 a-d	37.50 de	4.60 bc	1.13 c	81.50 b	31.03 bc	53.85 a	\$888 a-c
DP 1820 B3XF	1,706 b-d	39.78 a-d	4.68 bc	1.23 a	82.73 ab	33.50 a	54.23 a	\$854 bc
NG 5711 B3XF	1,701 cd	38.33 b-d	4.35 c	1.20 ab	81.47 b	29.70 d	53.83 a	\$846 bc
AMX 1828	1,643 de	37.14 de	4.91 ab	1.18 b	83.60 a	31.47 bc	53.42 a	\$815 cd
NG 3930 B3XF	1,532 e	35.68 e	4.56 bc	1.16 bc	82.50 ab	28.53 e	53.65 a	\$757 d
Average	1,768	38.71	4.71	1.18	82.56	30.79	53.44	\$877
p-value	0.0007	0.0017	0.002	0.0049	0.0251	<.0001	<.0001	0.0026
pLSD	146	2.644	0.405	0.049	1.37	1.06	0.88	\$84
CV	7.53	5.86	7.46	3.37	1.21	4.39	2.14	8.12

<sup>1</sup>Color and leaf grades set to base levels (41 and 4, respectively) due to lack of proper lint cleaner on gin.

<sup>2</sup>Return per acre calculated as (lint yield per acre X loan value per pound) - seed cost per acre.

\*Variety tolerant to 2,4-D.

**2019 Texas Co. Irrigated RACE Trial Results**

**Planted: May 16th**

**Seeding Rate: 52,000**

**Irrigation: center pivot**

**Harvested: November 14th – 15th**

Variety	Lint Yield (lbs. per acre)	Turnout (%)	Micronaire	Length (inches)	Uniformity (%)	Strength (g/tex)	Loan Value <sup>1</sup> (cents/pound)	Return <sup>2</sup> (\$/acre)
NG 2982 B3XF	1,168 a	32.89 a-c	4.41 bc	1.07 d	80.90	29.6 bc	46.98 c	\$448 cd
DP 1612 B2XF	1,161 a	33.42 a-c	4.58 ab	1.11 c	81.37	30.4 ab	47.50 c	\$466 b-d
DP 1820 B3XF	1,155 a	35.36 a	4.41 bc	1.17 a	81.87	31.8 a	49.92 b	\$484 a-c
CG 3475 B2XF	1,150 a	33.96 ab	4.66 a	1.07 d	81.33	29.4 bc	46.77 c	\$450 cd
DP 1908 B3XF	1,132 ab	33.83 ab	4.22 cd	1.16 ab	81.80	31.6 a	54.12 a	\$520 a
NG 3930 B3XF	1,113 ab	33.80 ab	4.07 d	1.13 bc	81.87	28.4 c	52.73 a	\$503 ab
NG 3956 B3XF	1,073 bc	32.76 bc	4.23 cd	1.10 c	81.90	29.7 bc	47.98 c	\$431 d
ST 4480 B3XF	1,019 c	31.01 c	4.07 d	1.15 ab	81.70	30.8 ab	54.42 a	\$465 b-d
Average	1,121	33.38	4.33	1.12	81.59	30.19	50.05	\$471
p-value	0.0053	0.0872	0.0006	<.0001	0.5685	0.0052	<.0001	0.008
pLSD	70	2.49	0.24	0.03	1.18	1.56	1.89	\$43
CV	5.57	5.04	5.67	3.73	0.82	4.58	6.45	7.76

<sup>1</sup>Color and leaf grades set to base levels (41 and 4, respectively) due to lack of proper lint cleaner on gin.

<sup>2</sup>Return per acre calculated as (lint yield per acre X loan value per pound) - seed cost per acre.

**2019 Tillman Co. Dryland RACE Trial Results**

**Planted: June 18th**

**Seeding Rate: 26,000 40" row spacing**

**Harvested: October 30th**

Variety	Lint Yield (lbs. per acre)	Turnout (%)	Micronaire	Length (inches)	Uniformity (%)	Strength (g/tex)	Loan Value <sup>1</sup> (cents/pound)	Return <sup>2</sup> (\$/acre)
PHY 350 W3FE	639 a	28.18 cd	4.99 a	1.10 e	82.7 a-d	31.17 c	52.00	\$288
ST 5707 B2XF	575 ab	27.09 d	4.92 a	1.15 bc	83.1 a-c	34.67 a	52.62	\$266
PHY 400 W3FE	573 ab	30.15 a	4.57 bc	1.07 f	81.5 d	30.80 c	52.48	\$255
PHY 480 W3FE	565 ab	29.94 a	4.73 ab	1.11 de	83.5 ab	33.53 ab	53.40	\$256
ST 5600 B2XF	562 ab	29.15 a-c	4.99 a	1.12 c-e	82.1 b-d	32.13 bc	52.27	\$247
DP 1948 B3XF	554 ab	29.90 ab	4.67 a-c	1.22 a	83.9 a	35.20 a	54.32	\$256
DP 1851 B3XF	528 ab	29.15 a-c	4.42 bc	1.12 b-e	83.2 a-c	35.23 a	53.85	\$240
NG 4936 B3XF	514 a-c	28.17 cd	4.57 bc	1.14 b-d	82.1 cd	30.47 c	53.55	\$230
NG 5711 B3XF	481 bc	27.10 d	4.38 c	1.14 b-d	81.9 cd	32.07 bc	53.92	\$214
NG 3930 B3XF	443 bc	26.98 d	4.51 bc	1.12 c-e	82.5 b-d	30.37 c	53.43	\$194
CG 9598 B3XF	380 c	28.28 b-d	4.47 bc	1.15 b	82.5 b-d	31.90 bc	53.95	\$159
Average	528	28.55	4.66	1.13	82.64	32.50	53.25	\$237
p-value	0.0806	0.0019	0.0052	<0.0001	0.0425	0.0002	0.1304	0.1055
pLSD	146.9	1.64	0.3385	0.0309	1.3743	1.0228	NS	NS
CV	28.84	5.50	6.76	3.66	1.24	6.41	2.20	33.08

<sup>1</sup>Color and leaf grades set to base levels (41 and 4, respectively) due to lack of proper lint cleaner on gin.

<sup>2</sup>Return per acre calculated as (lint yield per acre X loan value per pound) - seed cost per acre.